

NPIC/TSSG/TPD/EL-648-68

3 September 1968

MEMORANDUM FOR THE RECORD

SUBJECT: Fort Belvoir Efforts in Digital Imagery Restoration

1. On 29 August [] NPIC/TSSG/TPD/EL visited USA ETL facilities at Fort Belvoir and talked to [] Chief of the Geological Information Systems Branch, about his "Image Processing" work.

25X1
25X1

2. [] is concerned with the recognition of geographic information such as railyards, roads, farmland, forest tracts, etc. . . To facilitate his work, [] has developed a computer based system for scanning imagery and applying a computer generated correlation filter to the digitized data. When there is a high correlation (i.e., when an area indicates a structural similarity to that specified by the filter) an automatic plotter makes a point on graph paper which can later be referenced to the scanned image.

25X1

25X1

3. The heart of the system is a DDP computer with an 8k core. This hardware necessarily limits the format size, speed, and versatility of the system. For example to correlate check a 9x9 inch frame of film with a single filter would take 5 days, 9 hours, 36 minutes. Tied in to the system is a teletype which can be programmed to print out an isodensity type display of the digitized array. Attached are some samples of their work.

4. Although the system is interesting, it is relatively crude, particularly when compared to the work being done by [] and others. As is the case in many pure research projects, data may be generated or interpreted in a unique manner which may lead to further enlightenment in other programs, thus it is suggested that periodic contact with [] be maintained.

25X1

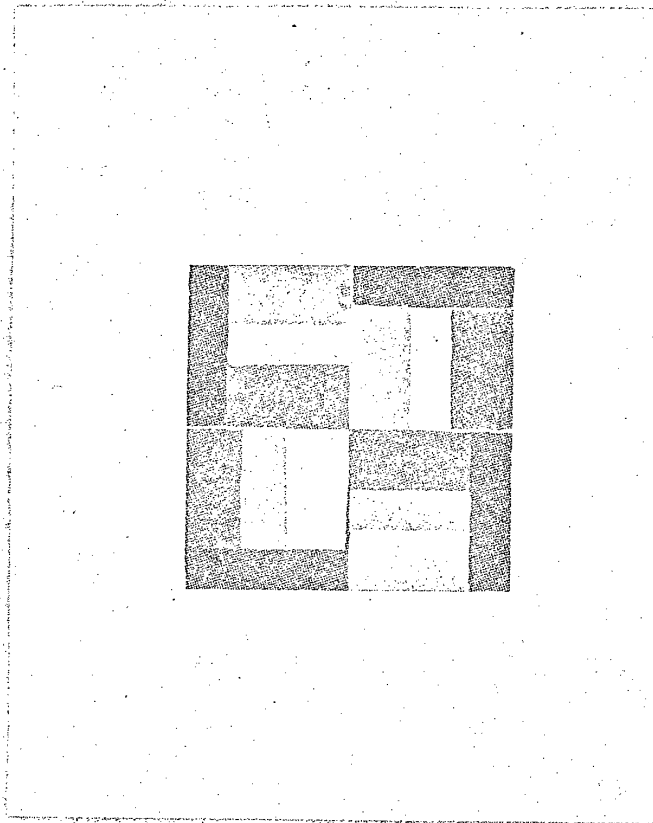
25X1
25X1

[]
NPIC/TSSG/TPD/EL

Attachment

~~SECRET~~

GROUP 1
Excluded from automatic
downgrading and
declassification



5 = 1 . X R 4

$$6 = 5 \quad \text{SM}(5)$$

✱ ✱

DS1 , 4, ? , 5 , 6 ,

DS1 , 4 , 5 , 6 ,

PRB1

[illegible]

IMAGE 1

PRB4

IMAGE 4

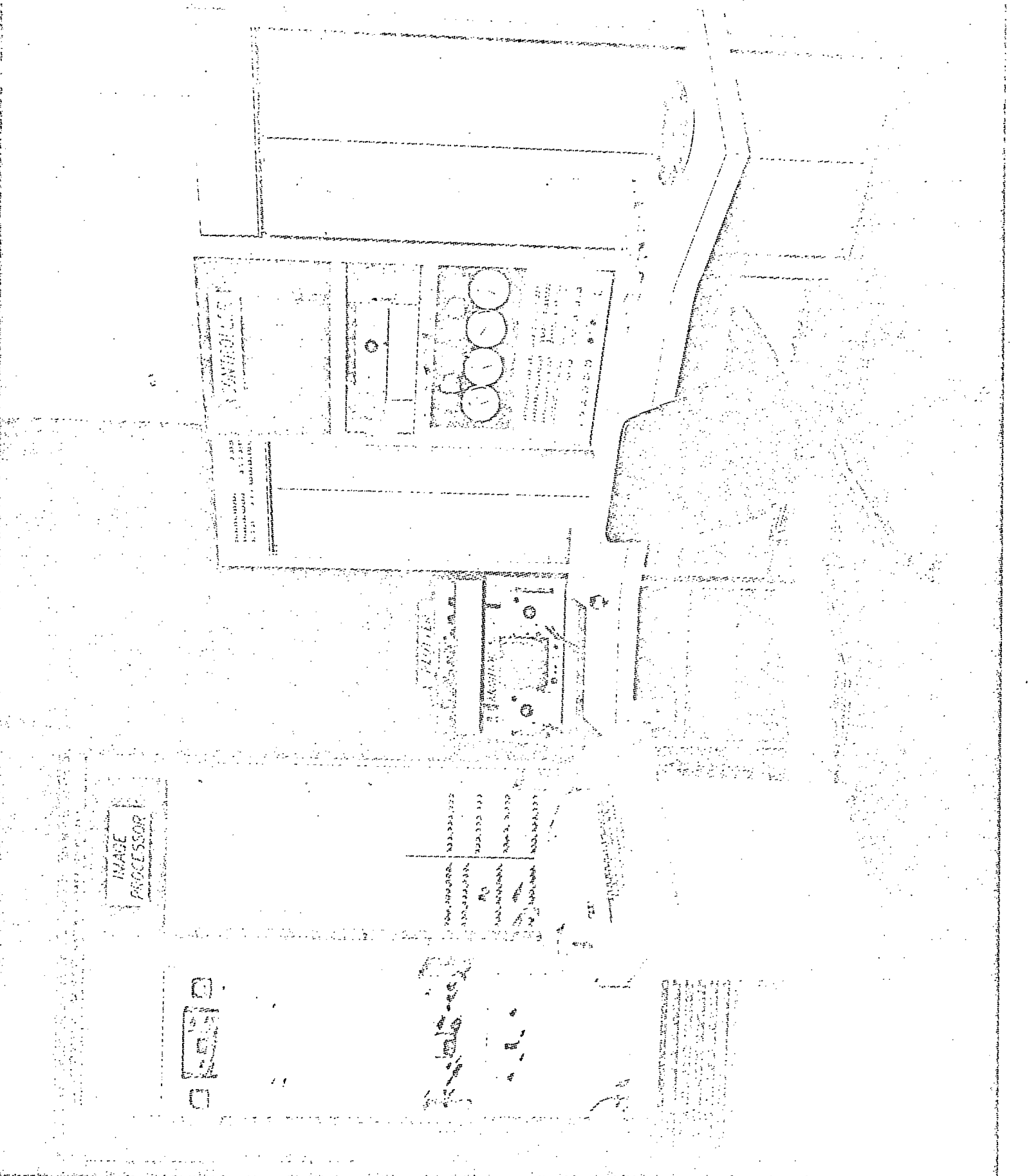
(The page contains dense vertical text, likely bleed-through from the reverse side or extremely small print.)

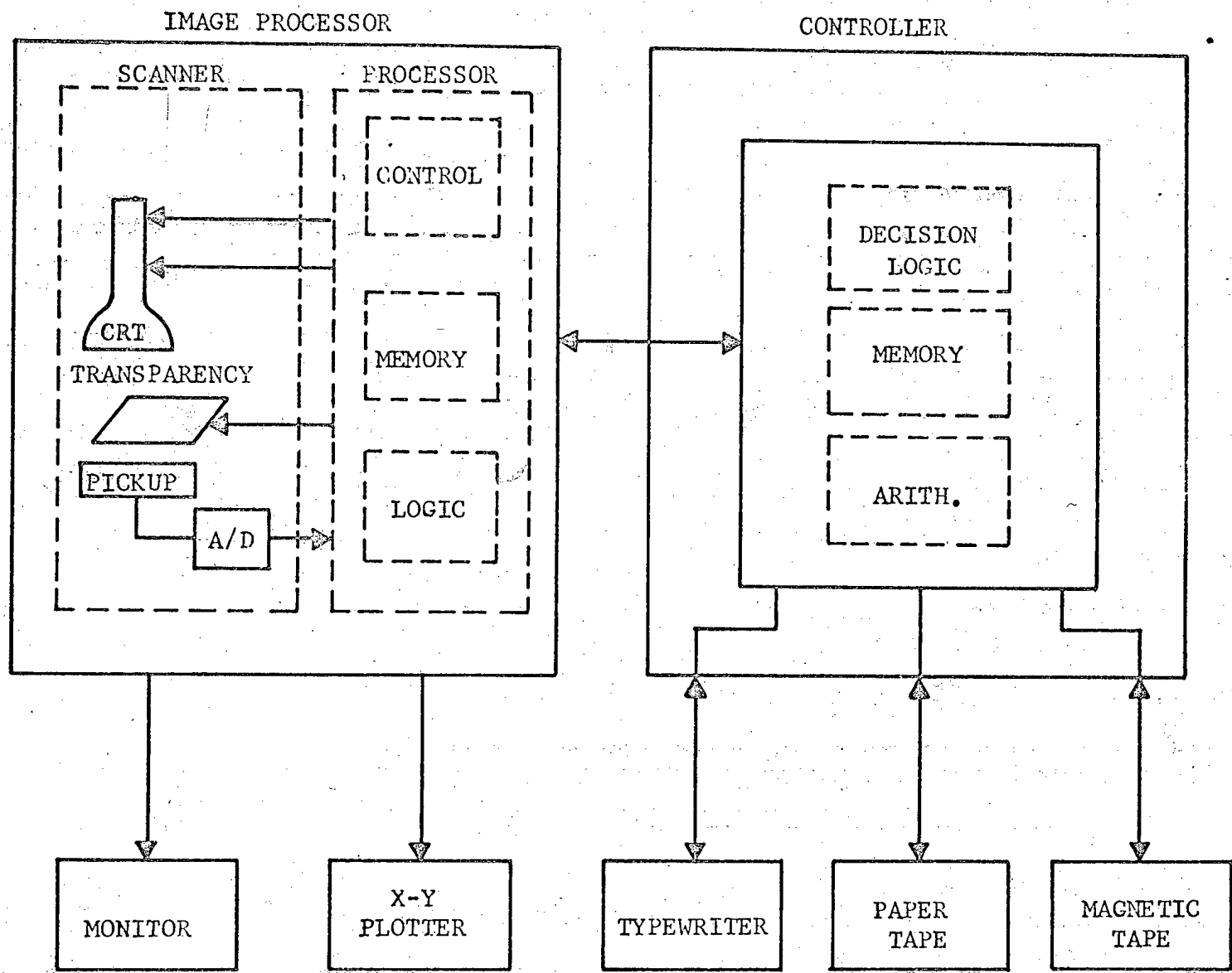
EXCLUSIVE OR OF IMAGES 174

[illegible]

APPLIED MASK(S) TO EXCLUSIVE IMAGE

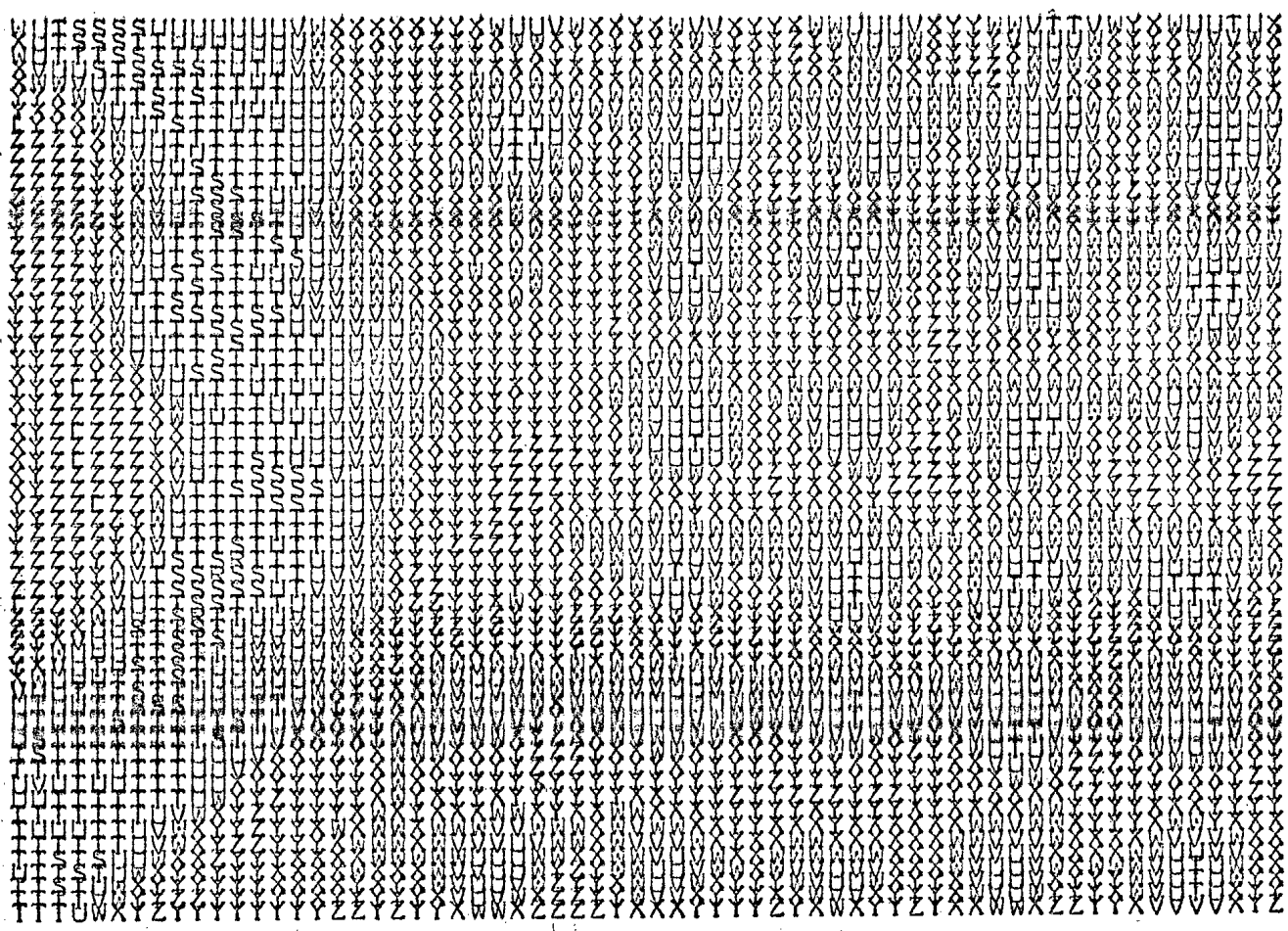
[illegible]



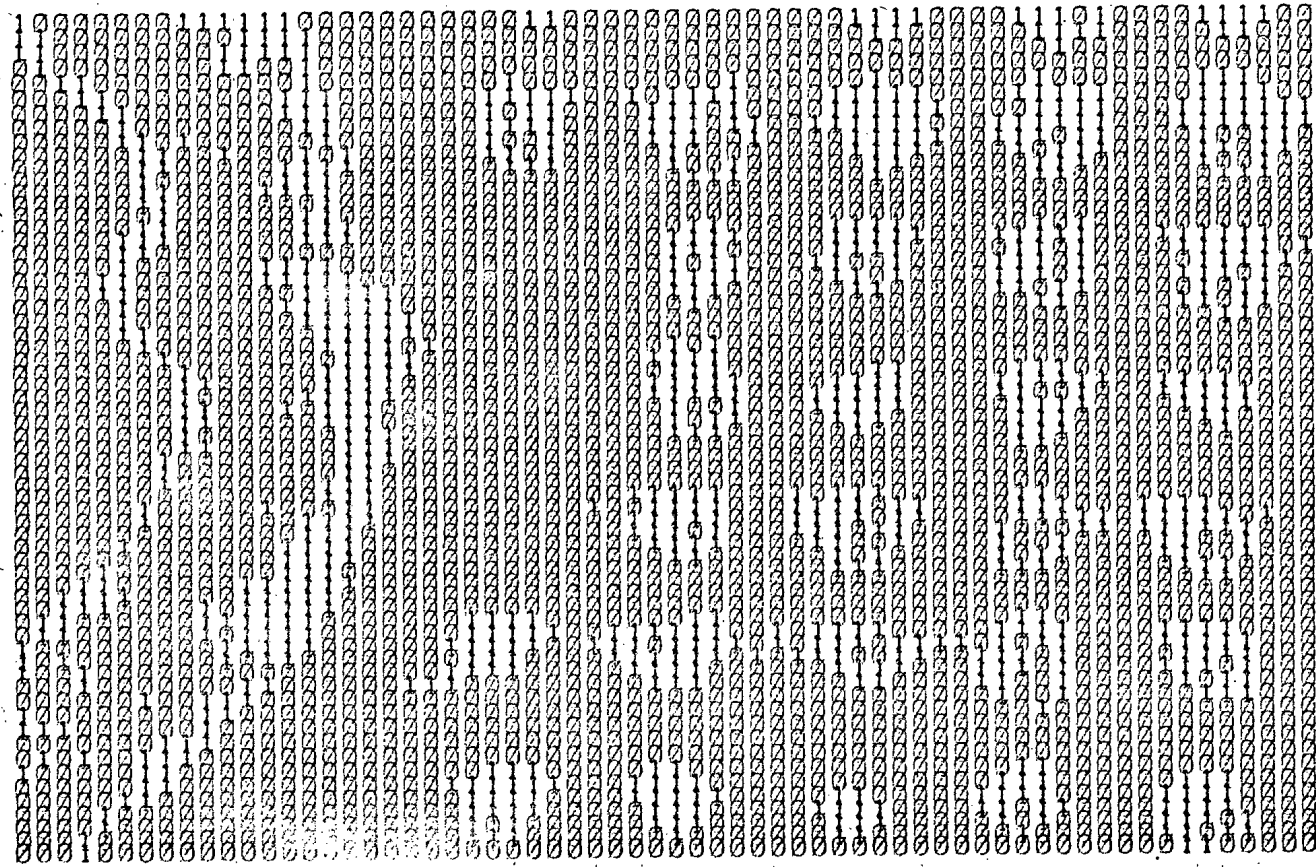


NATURAL IMAGE COMPUTER SYSTEM BLOCK DIAGRAM

GREY LEVEL IMAGE



BINARY IMAGE



MEAN, VARIANCE

DENSITY STATISTICS OF 1/16" BY 1/16" AREA

33.84, 3.32

DISTRIBUTION

34 15

35 179

36 384

37 450

38 532

39 767

40 905

41 775

42 98

TOTAL TEXTURE 1.2

GREY LEVEL CHANGES BETWEEN NEAREST NEIGHBOR
AND SECOND NEAREST NEIGHBOR

16614, 41187

DIFFERENCE NO. 1

1 13321

2 2925

3 356

4 12

DIFFERENCE NO. 2

1 23978

2 11533

3 4369

4 1119

5 134

6 4

GREY LEVEL STATS. OF 1/64" AREAS

MEAN, VARIANCE OF 16 SQS

37.21, 4.39/ 39.37, 1.34/ 39.00, 1.85/ 38.78, 1.98/

37.64, 6.04/ 39.57, 1.57/ 39.20, 2.17/ 39.04, 2.23/

37.06, 4.21/ 39.67, 1.81/ 38.93, 2.03/ 39.12, 2.46/

38.57, 5.18/ 39.48, 1.87/ 39.62, 1.75/ 39.26, 2.18/

ORCHARD ALGORITHM

DISTANCE MEASUREMENT

15.40 9.28 9.21 7.00

9.00 7.00 9.21 9.00

9.21 8.00 8.00 8.00

4.14 4.14 8.15 4.40

8.15 9.00 9.00 10.00

10.31 9.00 8.00 8.00

9.21 9.21

MEAN, VARIANCE, NUMBER 8.42, 4.62, 26

1080

SHIFTING ROUTINE

SR

865 670 514 399 344 344 378 414 396 284 173

39 48 60 109 179 246 257 222 174 128 102

108 140 135

SD

941 310 696 597 541 533 552 594 637 659 642

585 513 439 383 353 371 393 423 444 437 403

355 303 260

4D

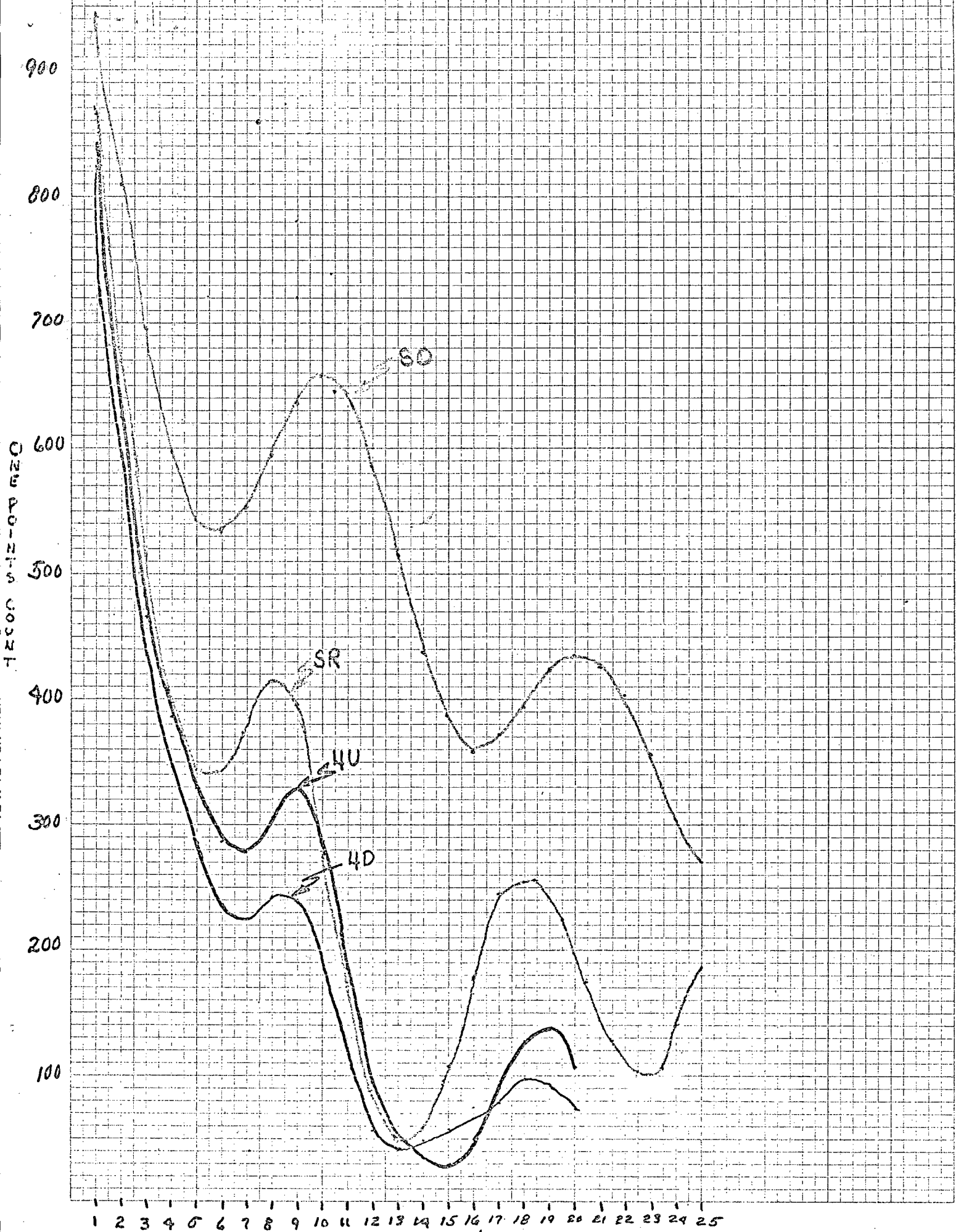
821 591 434 347 285 237 226 242 240 199 120

57 41 49 53 65 79 99 92 71

4U

840 623 467 386 330 287 279 306 330 237 187

96 50 35 30 46 91 129 138 137



C TL

1075, 250